graduated in science, and would be preparing to occupy the position of managers in optical works;

(3) Of other persons interested in learning the scientific construction or use of optical instruments.

Provision should be made for research work not requiring a highly specialised or expensive plant. Special investigations might be referred to the National Physical Laboratory, or any other laboratory suitable for the purpose.

It is also worth considering whether a good journal or paper should not be published, devoted to scientific instruments and other matters concerned with optics.

We are aware of the difficulties which stand in the way of putting into immediate operation a scheme which would satisfy in a comprehensive manner all the above conditions. It will therefore be necessary to contemplate a transitional period leading up to what we ultimately hope to obtain.

In considering the provisional arrangements, regard must be had to the fact that already some very good work in the training of operatives of different classes is being done at the Northampton Polytechnic Institute, where a certain amount of modern machinery and apparatus has been provided, and young men and women are receiving useful training, the value of which has been recognised by the Government. We may also direct attention to the valuable research work being carried out in King's College, London, under the Glass Research Committee of the Institute of Chemistry. The instruction given at the Northampton Institute should, however, at once be supplemented by more advanced teaching in some convenient institution of university rank. Stress has already been laid on the immediate appointment of a principal or director, and there is no reason for delaying the formation of the Advisory Council. So soon as the preliminary work of organisation permits, plans should be prepared for a new building, which, in our opinion, is essential.

The scheme of the London County Council represents a carefully considered attempt to utilise and extend the teaching given in existing institutions, and to reconcile conflicting interests. Its object is, therefore, the same as that which we contemplate in the transitional period, and in its main features it seems to differ little from our proposals. It is not with the object of making any captious criticism, but merely to prevent possible misunderstanding, that we desire to point out what seem to us to be serious defects in the details of the scheme.

It is provided that the Imperial College of Science should institute a separate Department of Technical Optics, with a head who is also to exercise some undefined powers of general supervision over the whole scheme. Being a member of the staff of the Imperial College, he would presumably be appointed by the governing body of that institution, and primarily be responsible to it. He would have at the same time powers over the course of instruction at another institution that had no voice in his appointment. His relationship to the Advisory Council is not defined, and the proposal in its present form does not seem to us to be conducive to harmonious working. It also seems to perpetuate what, in our opinion, should only be a transitional stage. Our own proposal contemplates that the appointment of the Director of Studies should be primarily vested in whatever body is constituted as the main governing body.

Another fundamental defect of the scheme is implied in the wording defining the distribution of the work between the Imperial College and the Northampton Institute. Stress appears to be laid on post-graduate work conducted at the Imperial College, and research work is confined to that institution. If it be meant that the normal course of instruction should begin with a degree course in pure science, and the higher technical teaching should only begin after such a course is completed, we must express our dissent from that view. There may be some cases, no doubt, where a graduate in science will turn his mind towards technical optics, and provision should be made for him; but the centre of gravity of the institution must be a course extending over two or three years, in which teaching in science is, *ab initio,* directed towards the necessities of its optical applications. As regards research work, the teachers in any institution which may be built, or during the transitional period at the Northampton Institute, should be of sufficient standing to be able to conduct research work, and though no expensive or elaborate plant need be supplied, and such research work need not form a prominent part of the activity of the institute, it is not advisable to lay down any hard-and-fast lines as to where researches are to be carried out. Special investigations, as has already been said, will probably be largely concentrated at the National Physical Laboratory, but they also should not necessarily be confined to any one place.

In conclusion, we may sum up the requirements which appear to us to require immediate attention:—

(1) The appointment of a supervising representative council.

(2) The appointment, under the proposed supervising council, of an administrating director, with special duties during the transitional period, which will include advice to the trade and the organisation of the different parts of the curriculum.

(3) The translation of suitable works and the abstracting of other important publications on technical optics.

(4) Pending the erection of a suitable building, the organisation of day and evening courses at the Northampton Institute, and arrangements for higher instruction at some other institution of university rank.

The term "technical optics" throughout the report is intended to include the chemical composition and manufacture of glass

The committee is willing to give further advice with respect to the selection of books for translating or abstracting, and any other matters connected with subjects referred to in the report.

NOTES.

WE notice with much regret the announcement of the death, at seventy-four years of age, of Prof. J. G. Darboux, permanent secretary of the Paris Academy of Sciences, professor of higher geometry at the Sorbonne, and a foreign member of the Royal Society.

THE following fifteen candidates have been selected by the council of the Royal Society to be recommended for election into the society: Dr. J. H. Ashworth, Mr. L. Bairstow, Prof. G. A. J. Cole, Mr. C. F. Cross, Dr. H. D. Dakin, Prof. A. S. Eve, Prof. H. Jackson, Prof. J. S. Macdonald, Prof. J. W. Nicholson, Dr. R. H. Pickard, Mr. C. T. Regan, Dr. R. Robertson, Dr. E. J. Russell, Mr. S. G. Shattock, and Prof. F. E. Weiss.

THE *Times* announces the death, on February 24, of Prof. Jules Courmont, professor of hygiene and deputy doyen of Lyons University.

MR. W. H. H. JESSOP, senior ophthalmic surgeon to St. Bartholomew's Hospital and president of the Ophthalmological Society of the United Kingdom, died on February 16 at the age of sixty-four. In 1885, soon after the introduction of cocaine by Koller, he investigated the action of this drug upon the eye. He devoted himself chiefly to the clinical side of his subject, and with great success. He was a member of several foreign ophthalmological societies and a constant visitor to international congresses. In this manner he became well known amongst Continental ophthalmic surgeons, and they were always made welcome as his guests. At the time of his death he was engaged upon two very important projects. The foundation of a really representative *British Journal of Ophthalmology* has already been successfully accomplished, chiefly as the result of his energy and enthusiasm. He was also actively promoting the affiliation of certain provincial ophthalmic societies with the London Society. Mr. Jessop was a lover of the arts, and his collection of Whistler prints is unique.

BY the death, in his seventieth year, of Dr. J. F. Fleet, India has lost one of the most learned members of the Civil Service. At an early period of his career in the Bombay Presidency he acquired a profound knowledge of Sanskrit and of the local dialects, particularly of the ancient Kanarese. His most important work, published in 1888, was vol. iii. of the "Corpus Inscriptionum Indicarum," in which, for the first time, the chronology of the Gupta period, one of the most difficult problems in the history of ancient India, was finally settled. Besides numerous papers in scientific journals, he contributed the article on epigraphy to the last edition of the "Imperial Gazetteer of India," and those on "Hindu Chronology" and "Indian Inscriptions" to the eleventh edition of the "Encyclopædia Britannica." He also engaged in the controversy, not yet finally settled, on the date of the Kushan Emperor Kanishka.

BY the death of Mr. R. H. Tiddeman on February 20, we have lost a field geologist of long experience and rare sagacity. Born on February 11, 1842, he was appointed by Sir R. Murchison an assistant geologist on the Geological Survey of the United Kingdom in 1864. He was promoted to geologist in 1870, and retired in 1902. For more than twenty years Tiddeman was engaged in surveying the Carboniferous rocks of Westmorland, Lancashire, and Yorkshire, and during this period he made the observations which enabled him to lay before the Geological Society in 1872 a classic paper of far-reaching consequence on the evidence for an ice-sheet in those counties. Later on he was temporarily engaged in North Wales, where he determined the Carboniferous age of some red rocks in the Vale of Clwyd, which had previously been regarded as Trias. From 1895 until his retirement he assisted in surveying the southern part of Glamorganshire. He was author of the Geological Survey memoir on the water-supply of Oxfordshire, a task for which his residence at Oxford after his retirement proved convenient, and was editor and in part author of the memoir on the Burnley coalfield. Contributions were furnished by him to upwards of nine other memoirs dealing with the north-west of England and North and South Wales. In his unofficial work his investigations in the Victoria Cave, and his philosophic work on reef-knolls and succession of episodes in the Carboniferous limestone, take first place. His views on the relative age of the deposits of the Victoria Cave and the Boulder Clay were long in receiving the appreciation due to them. In 1911, partly in consideration of his long record of useful work, but especially in recognition of his observations on the fauna and structures of reef-knolls, he was awarded the Murchison medal. He was elected president of the Yorkshire Geological Society in 1914, and served on the council of the Geological Society of London in 1905–10. He leaves a widow and two daughters.

THE Minister of Munitions, after consultation with the Admiralty and the Home Office, has appointed two committees—an owners' committee and a workmen's committee—to deal with certain problems connected with the Scottish shale industry. Prof. John Cadman will represent the Ministry, and will act as chairman of the two committees when they meet in joint session. Sir George Beilby has been appointed to act as technical adviser, and Mr. Hugh Johnstone will be a member of the committee and act as secretary.

THE annual general meeting of the Institute of Metals is to be held on Wednesday, March 21, and Thursday, March 22, in the rooms of the Chemical Society. The meeting on the Wednesday will commence at 8 p.m. and that on Thursday at 4.30 p.m. A special feature of the meeting will be a general discussion on metal melting, over which the president of the institute, Sir George Beilby, the head of the new Government Board of Fuel Research, will preside. The seventh annual May lecture of the institute will be given at the Institution of Civil Engineers, Great George Street, Westminster, on May 3, at 8.30 p.m., by Prof. W. E. Dalby, on "Researches made Possible by the Autographic Load-Extension Optical Indicator."

AN important programme of mining development is being undertaken by the Duchy of Cornwall, the principal object being the recovery of wolfram. This mineral is at present in great demand for the production of tungsten, a metal which constitutes from 18 to 20 per cent. of the modern high-speed cutting tool. The scene of the operations is on the extreme eastern edge of Cornwall, a few miles to the west of Tavistock, and the work on which the Duchy is engaged falls into three parts. The first is at Kit Hill, which forms the westerly part of Hingston Down, and rises nearly 1100 ft. above sea-level. Here a cutting is being driven north and south across the surface of the hill. For the greater part of the course it runs through granite, and in this section it has cut through a number of promising lodes of wolfram and tin. These lodes, which run roughly east and west, are vertical, and contain a varying number of veins of mineral. The largest disclosed so far is about 20 ft. wide. The second area on which the Duchy authorities are working is further east on Hingston Down. At the Plantation shaft a considerable quantity of wolfram has been blocked out, and work is to be pressed forward vigorously. The third part of the enterprise is represented by the mine and ore-dressing works at Gunnislake Clitters, situated on a steep bank beside the river Tamar, a mile or so from the Hingston Down Mines. Work will be resumed on the mine in due course, but at present attention is being paid to the remodelling of the mill, which stopped work in 1909, being idle until recently, and consequently deteriorated.

THE extent to which aluminium, which thirty years ago was merely a scientific curiosity, has become a war metal of the first importance is well illustrated by a recent order made by the Minister of Munitions under the Defence of the Realm Acts and the Munitions Acts, requiring that all persons shall in the first seven days of each month, beginning in March, send in to the Director of Materials, Hotel Victoria, S.W., monthly returns of all aluminium (*a*) held by them in stock or otherwise under their control on the last day of the preceding month; (*b*) purchased or sold by them for future delivery and not yet delivered on such last day; (*c*) delivered to them during the preceding month; (*d*) scrap or swarf produced by them. No return, however, is required from any person whose total stock of aluminium in hand, and on order for future delivery to him, has not at any time during the preceding month exceeded 56 lb. The variety of uses in which aluminium now finds application is shown by the fact that for the purpose of the order the expression includes ingots, notched bars, slabs, billets, bars, rods, tubes, wire, strand, cable, plates, sheets, circles, and strip. The Air Service claims in one way or another at the present time the bulk of the aluminium production. It is interesting to note, as a temporary phase of the disturbances caused by the war, that a number of aluminium transmission lines were taken down in the latter part of 1915 and replaced by copper.

Mr. G. F. Hill contributes to vol. xxxvi., part ii., of the Journal of the Hellenic Society, 1916, an elaborate paper on Apollo and St. Michael. He finds a parallelism between them as destroyers of an evil principle, as light controlling darkness, as the controlling agency of plague. Incidentally, he protests against the common view that the worship of saints is always a mere relic of paganism. There is no doubt that the medieval or modern worship is often engrafted on an old pagan stock, and the choice of the stock may have been assisted by some likeness of name or other association. "But the fact that we must not lose sight of is that, even had the pagan worship never existed, medieval Christianity was perfectly capable of inventing its own cults and legends."

The Journal of the Bihar and Orissa Research Society is doing excellent work in examining the manners and customs of the forest tribes of the province. In vol. ii., part iii., the Santals, with their peculiar marriage customs, receive special attention. Among them, according to the Rev. P. O. Bodding, "the original, and even now theoretically accepted, idea of woman seems to be that she is a kind of irresponsible and untrustworthy being, a necessary and useful, but somewhat inferior, member of human society." The Birhors, according to Mr. Sarat Chandra Roy, have an elaborate totemistic system, one peculiar feature of which is the belief in the magical power of certain clans over wind and rain. But the tribe is not at the present day organised, like the Arunta, as a co-operative supply association, composed of groups of magicians, each group charged with the management of particular departments of Nature. Birhor totemism has little influence on the growth of their religion, but its most noteworthy feature appears to be the belief in the vital connection between the human clan, their totem, the hill which is reputed to have been their original home, and the presiding spirit of this hill.

The Annals of Tropical Medicine and Parasitology for February (vol. x., No. 4) contains two lengthy papers on intestinal protozoa. The first, by Messrs. Malins Smith and Matthews, deals with these organisms in 250 non-dysenteric cases, of whom twenty were found to be carriers of the dysenteric amœba. The second, by the same observers, together with Mr. H. F. Carter and Dr. Doris Mackinnon, discusses the protozoal findings in 910 cases of dysentery examined at the Liverpool School of Tropical Medicine, of whom 410 were found to have protozoal infections. Of these, ninety-four were infected with the dysentery amœba, 231 with the non-pathogenic *Entamoeba coli,* and 207 with other protozoa. In some of the cases double and triple infections existed.

Mr. E. E. Lowe, the hon. secretary of the Museums Association, has for some time past been endeavouring to induce glass manufacturers in this country to take up the production of rectangular glass jars, such as are used in museums and other scientific institutions, since these have hitherto been made in Germany. The results of his labours in this good cause, which have been by no means light, he gives in the *Museums Journal* for February. Messrs. Baird and Tatlock alone have responded to the invitation to supply our needs in this direction. This they have been induced to do as the result of undertakings secured by Mr. Lowe from institutions in this country, India, and America. France, South Africa, and Australia will also, it seems, be glad to turn to this country for their needs in this regard, so that the demand for jars of this description should justify the initial outlay in the matter of making the moulds, the high cost of which has served as a deterrent with other manufacturers. To save this trade from falling again into the hands of the Germans it is to be hoped that all institutions using these jars will, as soon as possible, place orders with Messrs. Baird and Tatlock to encourage them in their venture.

In a pamphlet entitled "The High Price of Sugar and How to Reduce It" (London: Bale, Sons and Danielsson, Ltd.; 1*s.* net) Mr. Hamel Smith, editor of *Tropical Life,* directs attention to one of the results of our failure to think out and put into operation in normal times an Imperial scheme for providing necessary supplies of food. There was perhaps some excuse for our failure to encourage the production of corn and meat in this country, but there was none for our neglect to stimulate the production of such materials as sugar in our tropical possessions before the war. The fact of our dependence on foreign countries for sugar was notorious long before the war, yet practically nothing was done, nor apparently is anything of great importance being now done, to alter this state of things. Almost everywhere throughout the Empire where sugar is grown the yields are low, the chief causes being failure to grow the best canes available, neglect of intensive cultivation, and adherence to obsolete methods of manufacture. Perhaps the most notorious case is that of India, which, with 2,500,000 acres under sugar-cane, is able to produce only 2,600,000 tons of inferior cane-sugar, an average production of about one ton per acre, against a production of about four tons per acre in Java and nine tons per acre in Hawaii. Mr. Smith's proposals briefly are that the improvement of cane cultivation and of sugar-cane manufacture should receive immediate attention from the Imperial, Colonial, and Indian Governments, and he shows that we could without difficulty produce within the Empire all the sugar we require and have a considerable surplus for export.

In a paper published by the Commonwealth Bureau of Meteorology (Bulletin No. 14) Dr. Griffith Taylor makes a contribution on somewhat novel lines to the much-debated question of acclimatisation. The paper, which is entitled "The Control of Settlement by Humidity and Temperature," discusses the limits of comfortable settlement for the white races. This, Dr. Taylor maintains, is decided mainly by the humidity and wet-bulb temperature. Other elements are rainfall and wind velocity, but as the present investigation deals with colonisation from the point of view of comfort rather than from that of wealth, the influence of rainfall has been omitted. Dr. Taylor has drawn a graph with the twelve monthly means of wet-bulb temperatures and relative humidity at a given place plotted as a twelve-sided polygon, with wet-bulb ordinates and humidity abscissæ. This he terms a climograph. In height and area the climograph shows the range of temperature. In order to find the typical white climograph the author takes five towns in the southern, and seven in the northern, hemisphere, where white energy appears at its highest development. The resulting figure he uses as a criterion in all the climograph charts. He then takes Herbertson's natural region and draws a typical climograph for each, which in every case is compared with the white climograph. Applying the results more particularly to Australia, Dr. Taylor confirms the generally accepted opinion that the hinterlands of tropical Australia can develop only on pastoral lines, and that the coast lands of the north are useless for white settlement. The paper is a valuable scientific reply to the advocates of a white Australia.

METEOROLOGICAL information of a varied character is given in the Quarterly Journal of the Royal Meteorological Society for January. Among the papers communicated are "A Meteorologist in China," by C. E. P. Brooks; "Discontinuities in Meteorological Phenomena," by Prof. H. H. Turner; and a lucid communication by Sir Napier Shaw, director of the Meteorological Office, on "Meteorology for Schools and Colleges"; also a communication on "The Measurement of Rainfall Duration," by Carle Salter, assistant-director, British Rainfall Organisation. Records from self-recording gauges for fifty-eight stations scattered over the United Kingdom are as yet obtainable. Many of the records are for a short period, for a year or two only, and the recording gauges are of various patterns. The author acknowledges that many difficulties have to be contended with and he hints that possibly a standard type of recording instrument may eventually have to be insisted on, in the same way as in official sunshine returns. Mr. Salter has done good work in dealing with the method and preliminary difficulties encountered. A discussion on "The Forms of Clouds," by Capt. C. J. P. Cave, R.E., is of considerable interest. The paper is illustrated with beautiful photographs of the forms of cloud, and the author explains the different forms, and combats freely the forms suggested by many earlier writers on the subject. Much information is given on the different layers of air and the measurements of the heights of clouds. This cloud paper is in many ways suggestive to the would-be observer.

WE have received from Messrs. Flatters and Garnett, Ltd., Oxford Road, Manchester, a specimen of their cedarwood oil for use with oil-immersion microscopic objectives. As the result of tests we find that the oil is of good consistence and colour, does not become cloudy in cold weather, and has a high refractive index. The refractive index is stated to be 1·510, but that of the specimen sent to us was well above this, viz. 1·518. Immersion oil has hitherto been supplied from the Continent, and we are glad to direct attention to this British-made oil, which seems to fulfil every requirement. It is supplied in bottles at from 9*d*. to 4*s*. each, or in bulk.

THE sixth part of vol. v. of the Transactions of the Royal Society of South Africa contains a paper by Prof. J. C. Beattie, of Cape Town, in which are embodied the whole of the determinations of the deviation of the compass from true north and of the magnetic dip at 667 stations in South Africa. The two large maps show that the lines of equal deviation run across the country from north-west to south-east, the greatest deviation—27° to the west—occurring at the south-western corner of the country near Cape Town, and the least—14° west—at Beira. The lines of equal dip run from south-west to north-east in the south-eastern portion of the country, and show a tendency to run more nearly east and west in the northern districts. The dip is nearly 63° south in the south-east near East London, and diminishes to 52° south in the neighbourhood of the Victoria Falls in lat. 18° south. During the last ten years the deviation to the west has decreased a degree and a half to two degrees, while the dip has increased by a degree or a degree and a half.

PROF. MACMILLAN BROWN, in a recent number of the *Press* of New Zealand, discusses the appearance and disappearance of islands amid the western insular fringe of the Pacific. He recognises two curves of vulcanism, an outer, extending from the Aleutian Islands to Malay and New Zealand, and an inner, passing through the Marianne, Caroline, Gilbert, Ellice, Samoa, Tahiti, and Paumotu archipelagos to Easter Island. The outer curve lies off the enclosing continental shelf of the ocean, while the inner curve is parallel with the trend of the ancient continental shelf. The "main longitudinal crescent of vulcanism" has shifted from the inner to the outer curve, and with this shifting much archipelagic land between the two curves has disappeared. The main interest of the theory lies in the suggestion that this shifting has taken place in human times. The elevation of Rota in the N. Mariannes is dated to the Japanese Bronze age, 4000 years ago, by bronze bosses in the elevated coral. Ocean Island has risen and sunk several times, and in a previous elevation was inhabited by Polynesians, who made the regular Maori ovens. Ponape is supposed to have been a central point in a large archipelago with a great population. A considerable forest area with a dense population is required to account for the megaliths of Easter Island. In any case, those who speculate on migration routes must not assume as their basis the same areas and distribution of land in the Western Pacific as now exists. Prof. Brown, if the subsidence theory of atoll formation (which he assumes to be the only applicable theory) is applicable to the Western Pacific, must find much further and more direct evidence of those great archipelagos which he postulates as existing such a short time ago in what are now deep oceans with comparatively level beds. Existing coral formations do not point to the former existence of great islands. The animals and plants of still existing high lands should be more varied in genera and species if such lands were formerly parts of considerable archipelagos.

THE new technical journal, *Air*, does not appear to be a great innovation, judging from No. 3, which is in our hands. There is, however, in this number, one interesting article by Mr. E. A. Sperry, on "Aerial Navigation over Water," which describes very clearly and simply the methods which are in use for measuring the wind-drift of an aeroplane moving over the earth, and the various ways in which the pilot can obtain information as to his actual direction of flight relative to the earth. The construction and use of the drift indicator are explained; and the way in which the direction and velocity of motion of wave crests, and their distance from crest to crest, can be used to afford information as to the flight path is clearly dealt with. Another article, on "The Fundamental Equations of an Aeroplane," succeeds, after three pages of involved argument, in arriving at a simple aerodynamic conclusion which could be stated in as many lines. The reasoning reads as if the main object had been to make an exceedingly simple argument look as complicated as possible.

The youthful Society of Glass Technology has begun its career with every indication of a vigorous and useful future. At the meeting on January 18, held at Leeds, two papers were read on the subject of British glass sands. The first, by Dr. P. G. H. Boswell, on "British Sands: their Location and Characteristics," dealt with the chemical, mechanical, and mineral analysis of sands. The author stated that the analysis of British sands had proved their value. The proof of the pudding, however, is in the eating, and Mr. C. J. Peddle, in the second paper, "British Glass Sands: the Substitution of Foreign Sands by British Sands for High-grade Glass-making," demonstrated by actual melts made from native sands what could be done with the material. A good glass sand should attain the requisite degree of purity; it should be evenly graded, and the grains should be angular; consignments should not vary in character and should be ready for use when they reach the manufacturer. The author pointed out that all these essentials are fulfilled by Fontainebleau sand, but not all by British sand as at present supplied. That some British sands compare favourably with those of Fontainebleau as regards purity and grading has been established by the author, whose results in general were in agreement with those of Dr. Boswell. Much depends upon the treatment of the sand for the market. Excellent results were obtainable with properly prepared British sands, as was shown by the samples of glasses made from them, some of which could not be distinguished from similar melts made from Fontainebleau sand. The question of transport charges is one which closely affects the home sand industry; in the past, on account of through rates for carriage, foreign sands have frequently been delivered at the works at a lower cost than it was possible to supply the British material.

We have received from the Cambridge Scientific Instrument Co., Ltd., a new list of their resistance pyrometers for indicating or recording temperatures from −200° to 1200° C. They all depend on the platinum thermometer, of which four types suitable for different purposes are figured and described. The temperature is shown either on a Whipple indicator or on a Callendar recorder. A sample chart shows a continuous record of the temperature of a hot blast in an ironworks during twenty-five hours. The information given is sufficient to enable anyone with an elementary knowledge of electricity to set up and understand the working of the instruments.

Messrs. Henry Holt and Co. (New York) are publishing very shortly new and revised editions of Prof. A. L. Kimball's "College Text-book of Physics" and Prof. Martin's "The Human Body: Advanced Course."

The new list of announcements of Messrs. John Wiley and Sons, Inc. (New York) (London: Messrs. Chapman and Hall, Ltd.) includes: "The Sun's Radiation and other Solar Phenomena," F. H. Bigelow; "Interior Wiring and Systems for Electric Light and Power Service," A. L. Cook; "Irrigation Works Constructed by the United States Government," A. P. Davis; "Bio-Chemical Catalysts," J. Effront (being vol. ii. of "Enzymes and their Applications"), translated by Prof. S. C. Prescott; "Microscopic Examination of Steel," Prof. H. Fay; "Fats and Fatty Degeneration," Prof. M. H. Fischer and Dr. M. O. Hooper; "Agricultural Chemistry," Prof. T. E. Keitt; "The Essentials of American Timber Law," J. P. Kinney; "Elements of Hydrology," Prof. A. F. Meyer; "A German-English Dictionary for Chemists," Dr. A. M. Patterson; "Mechanical Equipment of Buildings"—part ii., 'Power Plants and Refrigeration," L. A. Harding and Prof. A. C. Willard; "Printing: A Text-book for Printers, Apprentices, Continuation Classes in Printing, and General Use in Schools and Colleges," F. S. Henry; "The Efficient Purchase and Utilization of Mine Supplies," H. N. Stronck and J R. Billyard; "Stresses in Structural Steel Angles," Prof. L. A. Waterbury; "Sanitation Practically Applied," H. B. Wood; and "French Forests and Forestry," T. S. Woolsey, jun.

The classified list of second-hand instruments for sale or hire, just received from Messrs. C. Baker, 244 High Holborn, London, includes particulars of hundreds of microscopes, surveying and drawing instruments, telescopes, spectroscopes, optical lanterns, and other apparatus and accessories. The list is well arranged, and should be of real service to intending purchasers of second-hand optical instruments.

OUR ASTRONOMICAL COLUMN.

Determination of Star Colours.—An expeditious photographic method of investigating the colour-indices of stars has been tested by Mr. F. H. Seares at Mt. Wilson (Proc. Nat. Acad. Sci., vol. iii., p. 29). The method consists of making a series of exposures with graduated exposure-times, first through a yellow filter and then without filter. In this way the ratio of exposure-times necessary to give images of the same size in yellow and blue light is determined. The colour-indices are then derived by reference to a curve showing similar ratios for standard polar stars, the colours of which have already been ascertained by a comparison of their photographic and visual magnitudes. In general, the method of exposure-ratios gives excellent results, showing no systematic errors of any importance which depend upon stellar magnitude. The probable error of a colour-index derived from a single exposure-ratio is 0·07 magnitude. The method would appear to be of special value on account of its independence of stellar magnitude, and because it gives a direct measure of the colour. The results obviously include that part of the colour which is a function of the star's intrinsic luminosity, and also such colour effect as may be due to the scattering of light in space. An interesting outcome of the new observations is the confirmation of the previously reported conclusion that there are no faint white stars in the vicinity of the pole, though this is apparently not true of all parts of the sky.

Manchester Astronomical Society.—It is gratifying to note that the activity of the Manchester Astronomical Society has been well maintained. The journal for the session 1915–16 indicates a membership of about 120, and an average attendance at the meetings of forty-seven, while no fewer than eighteen members contributed papers relating to their own observations. A summary of the proceedings is given, and the papers printed at length include "The Colours and Spectra of the Stars," by Father Cortie; "Satellite Systems," by Prof. R. A. Sampson; and "Astronomical Drawings," by W. Porthouse.

Canadian Observer's Handbook.—The Royal Astronomical Society of Canada renders a valuable service to amateur astronomers in the Dominion by the annual issue of "The Observer's Handbook." The volume for 1917 includes the usual astronomical information in a convenient form, and an extensive set of tables by means of which the times of sunrise and sunset in any part of the country can very readily be determined. Another feature calling for special mention is a catalogue giving the chief known facts regarding 276 stars and 13 nebulæ, including proper motion, parallax, spectral type, and radial velocity. There is also a simple guide to the constellations, with maps. The price of the handbook is 25 cents.